



STEM Day Activities

1 – Blowing out birthday candles

Materials – candles (birthday, tealight – something not more than a 3-4 inches tall), baking soda – 2-3 tablespoons, vinegar – $\frac{1}{4}$ cup, small bowl, play-doh or other device to hold the candle upright, matches or lighter

Do you have some extra birthday candles left over from a recent celebration? Use science to blow them out – no cake required!

When baking soda and vinegar are combined, there is a chemical reaction. Maybe you've seen the bubbling and fizzing when making a model volcano? Those bubbles are actually carbon dioxide – the same gas that we exhale as we breathe.

To set up this activity, place a candle in the center of a small bowl. Use a little bit of play-doh, or other materials to help it stand up straight. Sprinkle baking soda on the bottom of the bowl, all the way around the candle – you'll want this to be fairly spread out, not big piles. Then, with adult supervision light the candle. Once the candle is lit, carefully pour the vinegar into the bowl along the outside edges. You'll want all of the baking soda to get wet. After a few seconds, you'll start seeing a chemical reaction – and after enough carbon dioxide gas is formed, the candle will go out!

Extension: Use a taller candle, or use a small dish to lift up the candle a little bit. Re-do the reaction to see if the carbon dioxide can stay concentrated enough to extinguish the flame. The further the gas has to travel, the more diluted it can become, so you may need to use more baking soda and vinegar to produce more gas.

2 – Soap into Clouds

Materials – Ivory bar soap, microwave, microwave-safe plate, knife, cutting board (optional – marshmallow and water bottle)

Ivory bar soap is different than other bar soaps – it’s made with little air pockets inside! Take a little time to look at it – even wash your hands with it to see if it looks different than other bar soaps you’ve seen.

When something heats up or cools down – it can often change the size of the item. If water freezes inside a pipe, the pipe may burst. If you want to test this theory before you start with the soap – try microwaving a marshmallow, or freezing a very full plastic bottle of water.

Heating up the Ivory soap will change its shape and structure. Before you start, make a prediction about what the soap will look like. Will it expand like a marshmallow? Will it change its texture? Will it be soft or hard?

Start by placing the full bar of soap on a microwave safe plate in the microwave. Microwave the soap for 20-30 seconds, and then remove from the microwave. Carefully examine it for changes. You can carefully touch it to see if you can feel a difference. You might see some changes at this point, and you might not.

The soap only has so much surface area in its original bar form. If you want to see more drastic changes, consider chopping the soap into ½ inch slices or chunks. There’s no right or wrong way to break up the soap – just let an adult help as it may be difficult to cut.

Place the soap pieces back on the plate and microwave again for 20-30 seconds. You should see some changes this time. Continue microwaving in 30 second increments for 2-2 ½ minutes. After this, you won’t see a change, and you’ll have to wait for the soap to cool off before you can easily touch it.

Once the soap has expanded and cooled enough to touch – take some time to play with it. Did it do what you thought it would? If you sliced it differently – or even grated it, what might have happened?

Girl Scouts always use resources wisely – so try taking a bit of the soap to wash your hands! Does it work? Keep the soap near a sink so you can use it throughout the day!

3 – Newspaper Towers

Materials – sheets of newspaper, masking tape or painters tape

Who can build the tallest free-standing tower? Using limited materials in this activity means that you need to use a lot of creativity!

Each person gets one full sheet of newspaper – make sure that everyone has the same type, no glossy ad sheets. Also, measure out the same amount of tape for each person – starting with about 6 inches is a good spot.

You can tear, fold, crumple or roll your paper (or anything else you can think of – there's no limit to what you can do!) and then use the tape where you need to in order to keep things standing.

If something starts working, great! If something starts to take a tumble, stop and re-evaluate your plans.

You can repeat this activity as many times as you have newspaper sheets – so take your time to perfect your design! If you want to add to the challenge, add in another sheet of newspaper and a little more tape! Or, try to build something with only one inch of tape! If you're working with others – have the person that built the tallest tower in one round of designs determine the next challenge for the group!